

TWO-QUEEN HIVE MANAGEMENT USING PACKAGE BEES IN THE PEACE RIVER AREA, ALBERTA, CANADA

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For ten years we have used a two-queen beekeeping system for our 1500 colonies starting each year with 2-lb* packages of bees. Our results have been sufficiently economical and beneficial for us to continue with the system, although it involves extra equipment and labour.

The Peace River area is the northernmost beekeeping area in Canada, and although the honey flow can be over by the first two weeks of August, we do not start the second queens until the first two weeks of June. This leaves very little time for the colony population to build up, but for some reason the honey production is better than when the second queen is installed at any time between 1 April and 1 June. I do not know why this is, but Don Nelson of Beaverlodge has shown that honey production depends directly on queen-related factors and he found that as few as 28% of package queens remain good queens throughout the season. The use of two queens enables many of the troubles to be corrected, thereby increasing the final honey crop.

Advantages and disadvantages of a two-queen system

The economics of using two queens is the first advantage. Our ten-year average honey production is 250 lb per hive, whereas other outfits in the area of the same size that used single queens have had averages of 175 lb for the same ten years. With the single-queen

*1 pound (lb) = 0.45 kg.

system we used to operate, we installed 2-lb packages in April with two brood boxes and five honey supers, without a queen excluder. Some spring feeding was done, and we destroyed queen cells for swarm control.

The additional 75 lb per hive from the two-queen system gives us a net financial gain, as shown below. In 1982 the price of honey in Canadian dollars was \$0.60 per lb, so the additional crop gave us \$45 per hive, plus say \$2 for wax, i.e., \$47 per hive. Additional costs per hive were:

one extra queen	\$5	
extra labour	\$10	
3 extra supers	\$6	(\$20 each, 10% depreciation)
machinery	none	
extra truck	\$2	(cost \$15 000, i.e. \$10 per hive, 20% depreciation)
extra fuel	\$5	
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Total per hive	\$28	
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The net gain is thus \$47 less \$28 per hive, or \$28 500 on 1500 hives. Other advantages include better honey quality and easier swarm control.

Disadvantages are: the need for a bee blower when taking honey off, because of the use of queen excluders; more equipment for proper management; more labour. The extra labour is essential, and it may be difficult for some beekeepers to find qualified help and to provide housing, etc.

Equipment and method

We use 10-frame Langstroth boxes for our 1500 hives, each with two brood boxes, five honey boxes, three queen excluders, one division board, and one frame feeder. Our equipment includes three large trucks with 20-ft* decks, two having electrically operated tailgates. We have 9000 sq ft of warehouse space, and extract our honey in three 72-frame Kelly extractors, using also a Cook and Beal uncapper and a separator for wax handling.

Installing the bees

We buy 2-lb packages with one queen, usually in the first few days of April. We hive the packages only when weather is as suitable as possible, and never on a bright day when the bees could be disorientated and lost. We remove three frames from the centre of the brood box and release the queen directly among the bees in the space thus left. Warm syrup (2 parts sugar to 1 part water by weight), with terramycin and Fumidil-B, is provided when the packages are installed. We examine samples of bees for nosema disease, and if it is found, Fumidil-B will be used in the second feeding as well.

Approximately a week after hiving, the colonies are quickly checked: clusters of bees in the wrong place are moved closer to feeders, hives with weak colonies are marked, and any that are queenless are requeened.

The next feeding is left until about 18 to 20 days after hiving, because it will stimulate egg laying more once new bees have started to emerge and pollen is coming in. Also, the

*1 foot (ft) = 0.30 m

weather is then warmer. From this time on, the feeder is kept full until into June. Terramycin is also given with every feeding.

Subsequent management

The second check is done in the last week of April and the first week of May. We clip the queen's wings, apply terramycin dust, equalize colony strengths somewhat, and mark all weak colonies. I have found that when a crew is checking hives at this time they do a better job of inspection if they are required to find the queens. Hives with weak colonies are marked so that we can help them by adding bees now and later—we simply shake a few bees from the better hives in front of marked weaker ones. This is done only after the queen has been found in the stronger ones.

About 5–15 May the hives are moved from their spring locations to summer quarters, and a second brood box is placed underneath the existing one at this time. We place them below, to maintain heat early in the season, and to allow the bees to clean out the dead brood in the second box. The stronger colonies will use them when space is needed, and their presence will not hurt the weaker ones. The boxes are reversed later. Syrup is provided in the frame feeders right through May.

We try to check the hives for the third time in May. This is a fairly quick check to identify any queen problems, to equalize colony strengths, and to apply terramycin dust. In equalizing the colony strengths, we sometimes move brood from one hive to another as well as shaking bees in front of the weaker ones.

During the first week of June we interchange the two brood boxes, put a queen excluder above them, and place a third (honey) box on top. We also remove the entrance block and replace the frame feeder with a brood frame. The third box should contain darker honey combs if possible, to encourage the bees to go up through the excluder. We still put terramycin dust on, during every visit up until 1 July. Old fertilizer bags are put under the front of the hives to keep grass out of entrances.

Interchanging the brood boxes accomplishes a number of things. Firstly, the colony should be strong enough by then to take advantage of the second brood box, and the queen will quickly lay eggs in the warm and cleaned combs now positioned above the brood nest. Secondly, the bees will move any surplus food up through the excluder into the honey box, and thus allow more room for the queen to lay eggs. Thirdly, the bees will become better used to the excluder when there is brood directly underneath it.

The second queen

The second queens are put into the hives between 5 and 15 June. At this time the colonies should be fairly well into two brood boxes and the queen laying in both. We always start with our strongest yards first, and leave as long as possible those where colonies develop later, to allow them to gain in strength. We can deal with about 200-250 per day with a four-man crew.

The old queen is found and placed in the brood box with the smaller amount of capped brood and honey. This box is placed on the bottom board with a queen excluder on top of it. Two honey boxes follow, with a solid division board the top of which has an entrance at the front of the hive. The second brood box (containing the older brood, adequate food

and most of the bees) is placed on the division board, and in it is placed the new queen in a three-holed cage supplied with candy; finally the hive lid is put on top. Green grass is stuffed loosely into the top entrance to restrict the movement of the bees flying out, and so to reduce the loss of bees from the top box.

The next check is left for 12–14 days, to allow the new queens to get firmly established and to check that larvae are present. The division board is now removed, and replaced by an excluder with a piece of newspaper underneath it. The top queen is found and her wings clipped. The bottom brood box is checked for swarm cells, by tipping it off the bottom board. When the hive is reassembled, a third excluder is placed above the top brood box—slid back to provide an entrance, since the division board has been removed—and a (third) honey box is placed above this third excluder.

Abnormal colonies—those with swarm cells or that are queenless—are dealt with at this time. Colonies with swarm cells are usually given one more chance, and only the cells are destroyed. Queenless colonies above the division board that have supersedure cells are left until the next visit, when we hope the new queen will be mated. We usually expect 20–40 of the 1500 colonies with new queens to be queenless.

The next check is usually done just before the honey is to be removed. The hives are stripped completely and checked for swarm cells, and for queenlessness or failing queens.

All the hives found to have normal brood nests at the top and bottom are reassembled with both brood boxes at the bottom and a queen excluder between them. The second excluder (above the second brood box) is slid back to provide an entrance. Then four or five honey boxes are placed on top, i.e. one or two empty ones as well as those already on the hive.

All abnormal colonies are thoroughly checked to determine the exact cause of the trouble. Those with swarm cells are taken apart and the bottom brood box, containing the old queen, is set to one side of the hive on a pallet or drip board. If possible the queen is found and killed, and bees from three or four frames are shaken in front of original bottom board. All swarm cells are left, from which one queen will emerge, mate and start to lay eggs, in this 'side' nucleus. A pallet is placed on top of it to provide a lid, left slightly ajar to provide an entrance. The top brood box is placed on the original bottom board and is quickly checked for swarm cells. If any are found they are destroyed, and the hive is reassembled with only one brood box and one (the new) queen. She is, of course, confined by a queen excluder on top.

Hives queenless in one part or the other are left as one-queen hives, with two brood boxes. Drone-laying queens are found and killed, and the hive left with only one queen.

Honey harvesting

Our honey crop comes from clover, alfalfa and rape, and earlier in the season the colonies build up on willows and dandelion.

We start to remove the honey crop about 15–20 July. We have to use bee blowers when we remove the boxes of honey, because chemical repellents will not move the bees down through queen excluders, which are still on the hives. We usually take the honey boxes off right down to the excluder, and replace them with four or five empty boxes.

We operate with a five-man crew and try to do four yards, amounting to 450–600 supers, each day. Four men remove the honey boxes and one works the brood chambers

for swarm control. We follow through with swarm control all the time the honey flow is on. The procedure already described is followed, except where mated queens are found in the side nuclei. These queens are used in any hive that might have two bad queens, or that has swarm cells from which queens have emerged—in this case both brood boxes with empty cells are removed to some place at the side of the original bottom board. Then a brood box containing a new mated queen is placed on the original stand, with a queen excluder and four or five honey boxes on top. If no nucleus has a mated queen, a queen that is good can be taken away from a hive that has two good queens, leaving it with only one. This may seem a lot of work, but the task is quickly accomplished because each queen is confined to a single box, and the boxes can be moved quickly without the need to look for queens.

This method of moving queens by moving boxes enables us to maintain a young prolific good queen in as many hives as possible, and this is very important in obtaining the best possible crops.

Once the honey flow is over, the hives are stripped down to two or three boxes, and the bees are killed with cyanide at the first hard frost. We use a bee blower to remove the bees from the hive, and leave them in the field where they fall. We extract most of the honey out of the brood chambers, leaving only the equivalent of about one heavy frame of honey in each brood box. Our hard work is compressed into five months, April–August, or in some years a little more. The brood boxes are cleaned and reorganized for the next season during the winter months.

Some beekeepers in our area overwinter their colonies, either indoors or out, but results seem to be rather variable, and we have found no economic benefit from overwintering.